SHIPMENT NO. 1
(For Multi-Vibrator Oscillator)

In this shipment of supplies, we are sending you the apparatus needed for you to practice sending code. As soon as this shipment is received, it will be advisable for you to check it over carefully and see that all the equipment has arrived in good condition. The equipment consists of the following:

1. 1-oscillator (wired).   3. 1-set headphones.   5. 2-pieces wire.

2. 1-type 1G6-G tube.   4. 1-telegraph key.   6. 1-code lesson.

MIDLAND TELEVISION, INC. DOES NOT FURNISH THE TWO BATTERIES NECESSARY TO PLACE THIS OSCILLATOR INTO OPERATION.

By following directions carefully, we are sure you will encounter no difficulty in getting this apparatus into operation. There are four wires leading from the oscillator and each of these wires are tagged. Two of them connect to a 45 volt "B" battery. One connects to B- and the other connects to B+. You can purchase any small type B battery having a voltage of 45 volts.

WARNING! MAKE CERTAIN THE PROPER BATTERIES ARE CONNECTED TO THE FILAMENT AND PLATES; IF NOT, THE FILAMENT WILL BE BURNED OUT.

In addition to the B battery, you will need what is known as a #6 dry cell. This is a 1.5 volt "A" battery used in some types of radio sets as well as for telephone work. Two wires are to be connected to this "A" battery. These are tagged. One wire goes to A- and one wire goes to A+. The A+ terminal on any battery of this type is the center terminal.

Using two short lengths of wire, which are included in your shipment, you are now to connect from the two binding posts on the sending key to the clips marked "KEY" on the oscillator. Now connect the headphones by inserting the plug on the end of the solid black lead in the single clip on the left (marked fone); the black lead with the red tracer connects to the right clip. Your oscillator circuit is now wired as shown in Fig. 2A on the back of this page.

When you have your oscillator wired as just described, you are then ready to place it into operation. Plug the type 1G6-G tube in the eight prong socket on the oscillator board. Give it about 5 seconds to warm up and then if you press the telegraph key, you should immediately hear a high-pitched sound in your headphones. After making several dots and dashes to be sure your oscillator is working properly you are then ready to start your code study. Complete directions for you to follow are given in the enclosed lesson on "How to Learn the Continental Code." Follow these directions closely and you will find this work not only interesting but quite easy to master.

The purpose in supplying the oscillator first is to let you learn the sounds of each letter before actually attempting to receive code signals. In your second shipment of supplies an automatic code sender will be sent you and this code sender connected with your oscillator, key and headphones will make it possible for you to easily and quickly learn to become a good continental code operator.

WARNING! WHEN YOU ARE THROUGH USING THE OSCILLATOR, YOU MUST EITHER PULL THE TUBE OUT OF THE SOCKET OR DISCONNECT ONE OF THE "A" BATTERY LEADS FROM THE "A" BATTERY: THIS TURNS THE TUBE OFF.

Even though your key is not pressed down and no signal is heard, the tube continues to take current from the batteries and if you were to leave it connected for

any appreciable length of time, you would run down your batteries even though you were not using the oscillator. Therefore, whenever you are through working for a while, be sure to either pull the tube out of the socket or disconnect one of the "A" battery leads from the battery.

As mentioned above, in your second shipment you will receive an automatic code sender. The automatic sender will be connected to the oscillator circuit you have built with the material in this shipment. We will give you the instructions for making these connections even though you will not need them until your second shipment arrives. Upon receiving your Instructograph (automatic code sender), read the instruction book carefully, unpacking and assembling the apparatus as explained on Page 2. Since you already have your code oscillator built, you will not need the buzzer, nor will you need to build another oscillator inside the Instructograph box as shown on Pages 9, 10, and 11. The tape is placed on the machine as shown in Fig. 1 on Page 7. but disregard the connections shown on this diagram to the buzzer unit. To connect your oscillator to the machine, simply connect one wire from the binding post marked "4" to the single clip on the left side of your oscillator board, then connect another wire from the binding post marked "5" to the center double clip on your oscillator board. This places the posts "4" and "5" directly in parallel with the sending key. Now when you place your oscillator in operation and start the code tape on the Instructograph, the code will be heard in the headphones. The connections are shown in Fig. 2B.

If you have followed these directions, you will find that the binding post marked "6" is not used, nor is the rheostat on the panel of the Instructograph used. The reason for this is that you have your oscillator unit built external to the machine instead of inside the box. We recommend that you do not attempt to build your oscillator inside the box at this time. If at some future time you desire to do so, you should follow the instructions shown in Fig. 2 on Page 9 of the Instruction Manual.
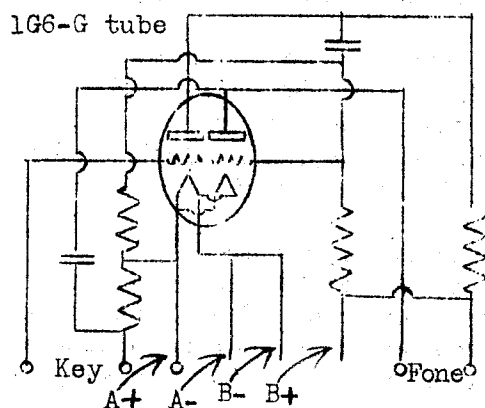

Fig. 1
Oscillator Board

Fig. 1 shows a schematic diagram of the oscillator. It is what is known as a "multi-vibrator" oscillator, and is of the same general type that is used in some television circuits. The connections for the batteries, key, and phones are shown. The tube (1G6-G) is a double high-mu triode. It is intended to operate from dry batteries and gives maximum output with minimum current drain.
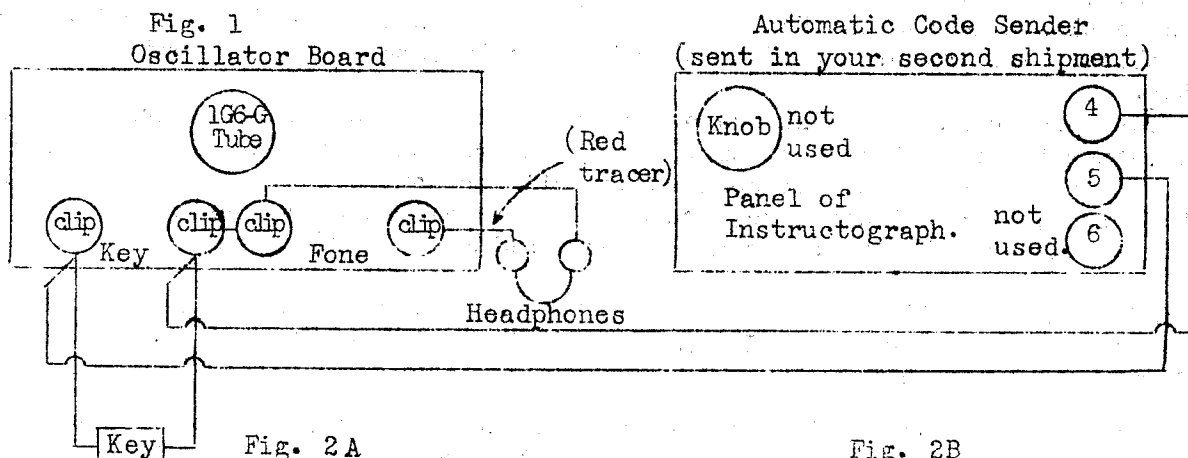

Fig. 2A

Automatic Code Sender
(sent in your second shipment)

Fig. 2B

LEARNING HOW TO SEND AND RECEIVE THE CONTINENTAL CODE

MIDLAND RADIO & TELEVISION SCHOOLS, INC.

To qualify for a United States' Second Class Radiotelegraph Operator License, it is necessary that the applicant be able to send and receive not less than 20 words per minute of solid copy material (plain language), and 16 words per minute of mixed copy material (code groups), using the continental code. Since there are many more jobs open for the radio engineer holding two licenses than for the "one-license" man, we are sure that every Midland student should be interested in qualifying for a Radiotelegraph second class license. This is in addition to the Radiotelephone First Class Operator License which each student must secure before he can graduate from Midland. Because of this interest in learning to send and receive the continental code, we present this lesson with the hope that it will be of material assistance to you.

LEARN BY SOUND

First of all, it should be understood by the student undertaking the study of code, that practice of the right kind, not "hit or miss", regularity and persistence are necessary. If you appreciate this fact, your progress will be steady, but if you fail to apply yourself, you cannot expect to get very far. As with everything else, your success in this work depends upon you and you alone. No one can study and practice for you. If you are to make a success of the study of code, don't have the idea that it is just another thing to play around with. Learning the code should be considered the same as learning a trade and, therefore, by all means it should be learned right at the start.

The telegraphic alphabet is made up of different sounds or tones. Each letter in the alphabet has a distinct sound of its own and it is by these different sounds that the code should be learned; not by the dot and dash method. For example, the letter "a" sounds like this: "dit-dah" and the letter "z" sounds like this; "dah-dah-dit-dit," and so on. The sound of every letter and number must be memorized. As soon as one hears the sound "dit-dah" he knows it is "a". For example, if you hear a new song hit and like it, by listening to it several times you know the very words of the song. So it is with the code. As soon as we hear any combination of dits and dahs, we know what the letter is.

Usually, a beginner makes the mistake of first memorizing the code by the visual method; that is, studing from a code card or chart, without the aid of sound reproducing devices, memorizing the dots and dashes which represent the alphabet. When a student memorizes the code by this visual method, he then pictures each character as being composed of so many dots or dashes and, so, when endeavoring to receive signals, he unthinkingly visualizes each dot and dash before writing the characters which are transmitted. YOU MUST BEAR THIS IN MIND. Unless the sound method is adopted, no appreciable receiving speed can be obtained. I am sure that you will realize this is logical when you condiser that it would be impossible for

an operator to receive, say, 15 or more words a minute if he first has to think of each character as being composed of so many dots or dashes before copying.

While it is possible that many of our students may have memorized the code by the visual method, still it is not to be construed that the code can not be learned by this same student using the sound method. By adopting the sound method, this system of learning would gradually be mastered, but a great deal of valuable time has been lost for those who have learned by the visual method. The sound method has become the universal system of instruction. It trains the student in such a manner that upon hearing a character he knows immediately and instinctively the letter for which it stands. You will do this subconsciously to a certain degree, depending upon the amount of practice you have had.

The continental code is made up of the following combinations of dits and dahs.

A dit-dah	J dit-dah-dah-dah	S dit-dit-dit
B dah-dit-dit-dit	K dah-dit-dah	T dah
C dah-dit-dah-dit	L dit-dah-dit-dit	U dit-dit-dah
D dah-dit-dit	M dah-dah	V dit-dit-dit-dah
E dit	N dah-dit	W dit-dah-dah
F dit-dit-dah-dit	O dah-dah-dah	X dah-dit-dit-dah
G dah-dah-dit	P dit-dah-dah-dit	Y dah-dit-dah-dah
H dit-dit-dit-dit	Q dah-dah-dit-dah	Z dah-dah-dit-dit
I dit-dit	R dit-dah-dit	

1 dit-dah-dah-dah-dah	5 dit-dit-dit-dit-dit	9 dah-dah-dah-dah-dit
2 dit-dit-dah-dah-dah	6 dah-dit-dit-dit-dit	0 dah-dah-dah-dah-dah
3 dit-dit-dit-dah-dah	7 dah-dah-dit-dit-dit	
4 dit-dit-dit-dit-dah	8 dah-dah-dah-dit-dit	

Period	dit-dah-dit-dah-dit-dah
Semicolon	dah-dit-dah-dit-dah-dit
Comma	dah-dah-dit-dit-dah-dah
Colon	dah-dah-dah-dit-dit-dit
Interrogation	dit-dit-dah-dah-dit-dit
Apostrophe	dit-dah-dah-dah-dah-dit
Hyphen	dah-dit-dit-dit-dit-dah
Bar indicating fraction	dah-dit-dit-dah-dit
Parenthesis	dah-dit-dah-dah-dit-dah
Inverted commas	dit-dah-dit-dit-dah-dit
Underline	dit-dit-dah-dah-dit-dah
Double dash	dah-dit-dit-dit-dah
Distress Call	dit-dit-dit-dah-dah-dah-dit-dit-dit
Attention call to precede every transmission	dah-dit-dah-dit-dah
General inquiry call	dah-dit-dah-dit dah-dah-dit-dah
From (de)	dah-dit-dit dit
Invitation to transmit (go ahead)	dah-dit-dah
Warning--high power	dah-dah-dit-dit-dah-dah
Question (please repeat after---); interrupting long messages	dit-dit-dah-dah-dit-dit

Wait	dit-dah-dit-dit-dit
Break (Bk.) (double dash)	dah-dit-dit-dit-dah
Understand	dit-dit-dit-dah-dit
Error	dit-dit-dit-dit-dit-dit-dit-dit
Received (O.K.)	dit-dah-dit
Position report (to precede all position messages)	dah dit-dah-dit
End of each message (cross)	dit-dah-dit-dah-dit
Transmission finished (end of work) (conclusion of correspondence)	dit-dit-dit-dah-dit-dah

The very first step in learning the code is to learn the sound of each letter, numeral and character. In order to accomplish this, it is necessary to have some sort of sending and receiving apparatus. While it is possible to use a high frequency buzzer connected in series with a dry cell and a telegraph key, still it is more advisable to build a vacuum tube oscillator which produces a sound very similar to that actually put on the air by a CW transmitter. The wiring diagram and parts specifications for such an oscillator is shown in Fig. 1. A cut of the type of batteries used is shown in Fig. 2.
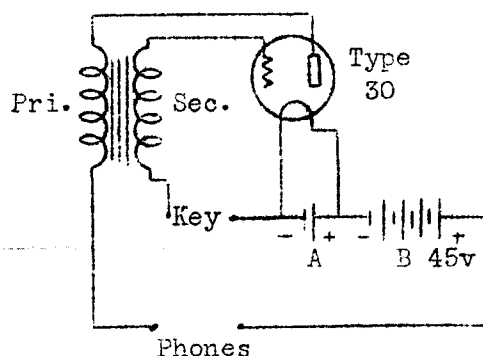

Fig. 1

It is possible to connect more than one key and one pair of headphones in this circuit. The headphones and keys are connected in series with each other. However, when keys are connected in series, it is necessary to provide a switch so that the circuit may be closed by the operator who is receiving, while the other person is sending. Then, when the sender changes to receive, he closes his key and the other person opens his key and starts to send. If two keys are to be used, be sure you purchase a type of key which has a switch on it so that the circuit may be closed.

HOW TO HOLD A KEY

It is of the utmost importance that the student learn just how to hold a key if he is to get the best results in making all letters and numbers correctly. The sender's ability in handling the key is the controlling factor on the accuracy of the receiving operator. Good sending immediately stamps you as a good operator. If the letters and numbers are not sent correctly, it is hard for anyone to receive. Therefore, the beginner in code work should always be careful to make all characters correctly. Everyone knows that habits are easily formed, and if they are bad habits, they are hard to overcome. Form a good sending habit first, and your speed will develop as you learn. Make all letters correctly and you will become a good sender; one that is easy to read no matter how fast you go later on.

In the first place, the key should be mounted at least 15 to 18 inches from the edge of the table to allow your elbow to rest firmly on the table. Hold your key firmly, not tightly, with the thumb and middle finger. Let your index or fore-finger rest lightly on top of the key. The correct placement of your hand is shown in Fig. 3. The elbow is placed on the table and used as a fulcrum, the wrist clearing the table 1 to 2 inches. As you can see from the illustration, the thumb is just underneath the outer edge of the key. The center finger curves sharply at the knuckles and is placed just slightly over the back of the key button with the index finger resting on the key button. The key must always be operated by a free arm movement; that is, the energy required to manipulate the key should be expended from the forearm and wrist and not from the hand or fingers. The wrist should go downward when each dot or dash is made. There should be no trace of rigidity in the hand or fingers when sending. Under no circumstances should you release the key when sending as this calls for a certain muscular movement which is not necessary. Keep your hand upon the key. See that your arm is well up on the table; that there is no pressure on the ulner nerve. Make sure there is no pressure there to congest your arm and that the blood circulates just as freely through your sending arm as it does the other. All dit and dah movements should be made with the forearm and wrist; not with the fingers. Do not release your grip after every word or sentence; this causes fatigue and holds down the speed.
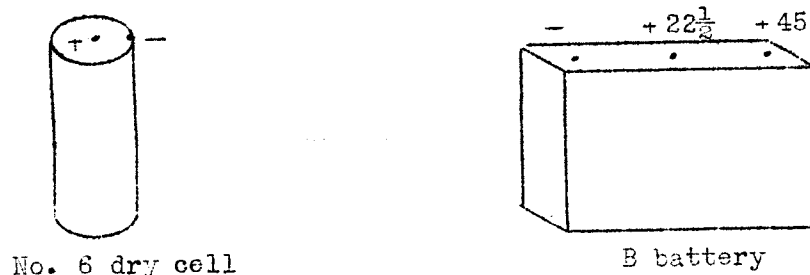

No. 6 dry cell   B battery

Fig. 2

Pushing down on the key for a moment and letting it come back rapidly will make a dit. For a dah, the key is held down much longer. The respective lengths of the dits and dahs and their separating spaces of the code are as follows. A dit has a definite length which depends upon the speed of transmission. A dah equals three dits. The space between dits and dahs of the same letter is equal to the length of a dit. The space between two letters is equal to three dits and the space be-tween words is equal to five dits. These relations should be maintained as accu-rately as possible by the operator to insure that the several dahs of a letter are equal in length and that the spaces between letters remain regular, regardless of the length of the letters.

Now if two persons cooperate in learning the code, one can send while the other re-ceives. Beginning with the letter "e", a dit letter, send dit with the key, about 4 to 6 in a group. The receiving student is to write down the letter "e", joining the letters together like this: _eeeee_ . Do not print the letter but write it in your natural handwriting. Practice on this letter for a while and then change to the letter "i". Make two dits (dit-dit); no more, no less. Send this letter four to six in a group. The receiving student again writes the letter "i" down in groups and dots the "i" after each group. Do not lift your pencil off the paper after each "i" is written to dot it. In copying words with the letters "i"

and "t" the student is advised to dot the "i" and cross the "t" after the word is sent. Never lift your pencil off the paper while copying words. Many students have the habit of lifting their pencils from the paper after each letter. This is a bad habit to form and is rather hard to break. Always write in your natural way.

The next letter is "s". Send just three dits (dit-dit-dit); no more, no less. A little difficult at first, but by constant practice you will get just three dits. The next one is "h", this time four dits (dit-dit-dit-dit). This is much more difficult to make than the letter "s". Only by persistent practice on these dit letters will you get the right idea of just how these letters should sound. Remember, these letters are to be read by their sound; don't get the idea to count the dits while receiving them. This is just another bad habit to get into. Always read by the sound of the letter. Start this in the beginning and you will make better progress. After you have thoroughly mastered the dit letters, then take up the study of the dah letters; these are t, m, and o. You should thoroughly master these before taking up the combination dit-dah letters.
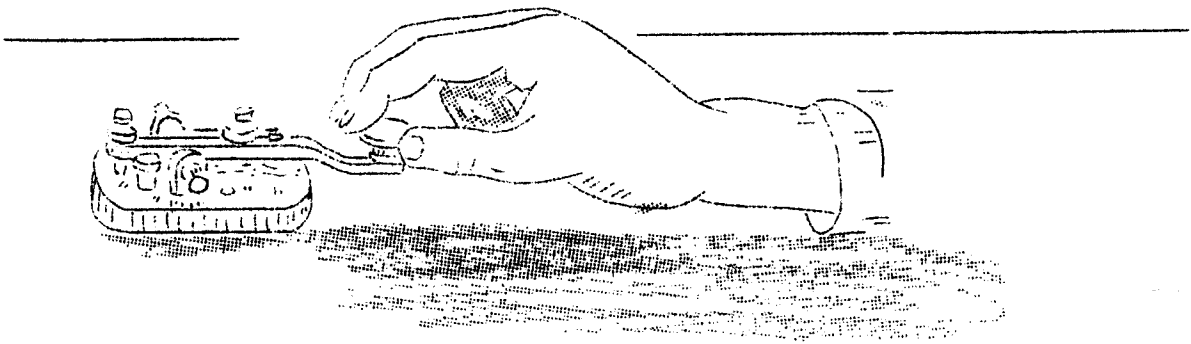

Fig. 3

In sending the letters which are composed of dits and dahs (for example, the letter "c" sounds like this "dah-dit-dah-dit), make them rapidly, but evenly with the key and you will get a rhythmic sound effect. Do not make it as "dah-dit....dah-dit"; this would really be "nn". Keep the dahs and dits close together in each letter in order to get their correct sound. Practice all letters, repeating them four and six in a group. Remember, there isn't anything so important to good telegraphing as clean-cut sending. There isn't anything so essential to such sending as uniformity. This is an example of uniform sending. "T-H-E C-O-D-E I-S R-E-A-D B-Y S-O-U-N-D." As it should not be sent: "TH--E C-O---D-E I--S R-E--A---D B-Y S-O-U---ND." The first is much more easy to read than the last, because all letters are sent correctly with uniform spacing between letters and words.

In studying the combination dit-dah letters, it is advisable to take only about four letters at a time. A good suggestion is to segregate them in groups as follows:

GROUP 1	GROUP 2	GROUP 3	GROUP 4
E dit	T dah	A dit-dah	J dit-dah-dah-dah
I dit-dit	M dah-dah	U dit-dit-dah	R dit-dah-dit
S dit-dit-dit	O dah-dah-dah	V dit-dit-dit-dah	L dit-dah-dit-dit
H dit-dit-dit-dit		W dit-dah-dah	F dit-dit-dah-dit

GROUP 5 GROUP 6 GROUP 7
N dah-dit K dah-dit-dah P dit-dah-dah-dit
D dah-dit-dit C dah-dit-dah-dit Z dah-dah-dit-dit
B dah-dit-dit-dit Y dah-dit-dah-dah X dah-dit-dit-dah
G dah-dah-dit Q dah-dah-dit-dah

GROUP 8 GROUP 9
1 dit-dah-dah-dah-dah 6 dah-dit-dit-dit-dit
2 dit-dit-dah-dah-dah 7 dah-dah-dit-dit-dit
3 dit-dit-dit-dah-dah 8 dah-dah-dah-dit-dit
4 dit-dit-dit-dit-dah 9 dah-dah-dah-dah-dit
5 dit-dit-dit-dit-dit 0 dah-dah-dah-dah-dah

GROUP 10
Period dit-dah-dit-dah-dit-dah
Comma dah-dah-dit-dit-dah-dah
Interrogation dit-dit-dah-dah-dit-dit
Error dit-dit-dit-dit-dit-dit-dit-dit

The groups including the numerals and punctuation should not be attempted until the student is sure of his alphabet. The miscellaneous groups should not even be attempted until the student can receive at a speed faster than 5 words per minute.

If the student does not have someone else with whom to work, progress may be a little slow until you secure an automatic code sending machine. These machines usually consist of a spring-driven motor so designed that a paper tape is pulled across a contact which alternately makes and breaks according to the dots and dashes punched in the tape. This machine takes the place of the person who usually does the sending and by having a variety of material on the tapes which come with the machine, it is possible to make splendid progress by using such an instrument. Before securing the automatic code sending machine, you can devote your time to learning the sound of the alphabet by using your oscillator and key. This is the first important step in becoming a good operator.

The student in code work may be discouraged when trying to remember the different sounds of each letter and number. This is only natural; remember, anything that is new to our minds will take some time to get accustomed to and code seems to be one of the hardest for most people. However, if you take it easy and don't get nervous or excited, always feel relaxed, you will get along much better. The only thing necessary to learn code quickly is concentration. Concentrate on each letter that is sent. Remember it by its sound. All that is necessary is practice in order that your subconscious mind may absorb these sounds. Our subconscious mind is usually slow in acting for us. It is only through practicing the code and listening to the sound of every letter that we can train our subconscious mind to become active. Once you have learned the code, you will never forget it because your subconscious mind has been trained and will retain its knowledge. As soon as we get our subconscious mind working for us, code becomes easy as with everything else you learned.

A FEW DON'TS FOR THE CODE STUDENT TO REMEMBER

Don't copy ahead of the sender; always copy behind, a letter behind at first, later, a word behind. Don't send faster than you can receive. Your sending should be an indication of your receiving speed. If you are not careful, the receiving operator will come back at you faster than you can receive and you will have to ask for a repeat. Don't try to send fast at first. Start by sending slowly; make all letters and numbers right. Speed will come later. Remember there are others who will listen to you and if you don't make your characters right, it will be hard for the others to understand your sending and will judge your ability accordingly.